RVGSS SAMPLE TASK ORDER # 3

TASK ORDER TITLE: Astronomical Object Surface Interaction Simulation Services

PERIOD OF PERFORMANCE: May 28, 2014 – May 27, 2015

TASK OVERVIEW:

The objective of this task is to provide simulation development, integration, verification, validation, analysis, documentation, maintenance, and troubleshooting support for space-based vehicle surface interaction with astronomical objects modeling efforts managed by the Engineering Directorate. The resulting non-real-time (NRT) and real-time (RT) simulation applications will be used in support of advanced exploration programs and project. In accordance with Statement of Work 3.3, Astronomical Object Surface Interaction Simulation Services, the contractor shall provide the technical requirements listed below.

TECHNICAL REQUIREMENTS:

1. The Engineering Directorate has historically used traditional computer modeling and simulation (M&S) to develop and investigate vehicle design concepts as well as their operations. The Engineering Directorate has a need to study and analyze space-based vehicle surface interaction with items such as soil, regolith and/or rock, including important effects such as slippage and contact. The targeted vehicle includes an astronomical object surface rover that will accommodate robotic manipulator devices or anchoring type mechanisms to engage in various surface operations. The contractor shall develop the technologies listed below and prototype their use on the selected project demonstration as indicated.

    1.1. *Rover Vehicle Modeling* – The contractor shall develop, verify, and document models of a wheeled rover deployed from a lander vehicle.
    1.2. *Anchor Mechanism Modeling* – The contractor shall develop, verify, and document models of anchoring mechanisms to secure the rover during surface operations.
    1.3. *Robotic Excavation Modeling* – The contractor shall develop, verify, and document models to address a rover-based robotic manipulator intended to excavate regolith or rocks and support sample drilling.
    1.4. *iSES Rover Prototype* – The contractor shall integrate these capabilities into an integrated Spacecraft Engineering Simulation (iSES) based wheeled rover subsystem. The contractor shall plan the work to support an integrated demonstration of the iSES rover and shall participate in conducting the demonstration. Verification of soil interaction with the integrated rover wheels shall be provided as part of this requirement.

DELIVERABLES & SCHEDULES:

1. Subtask 1 deliverables:
   1.1. Initial prototype demonstration of iSES (November 28, 2014) deployed rover system. This demonstration should be targeted for a desktop simulation environment as well as the Systems Engineering Simulator (SES) Video wall.
   1.2. Final prototype demonstration of iSES (May 27, 2015) deployed rover system. This demonstration should be targeted for a desktop simulation environment as well as the Systems Engineering Simulator (SES) Video wall.

DEPENDENCIES:

NASA shall provide access to required development resources including workstations, laptops, network infrastructure, software licenses, avionics system engineering units, vehicle and environment simulations, and supporting tools resources at JSC.